

# Composition of Functions

## Composition of Functions Warm Up

1. a) If  $f(x)$  and  $g(x)$  are polynomial functions, use the two tables of values below to complete the table of values for  $f(g(x))$ .

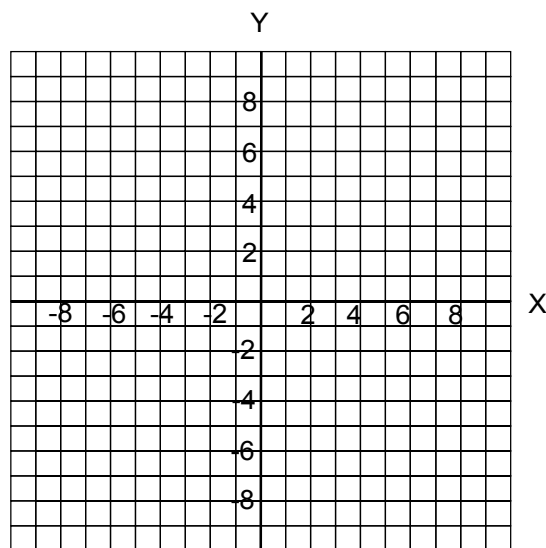
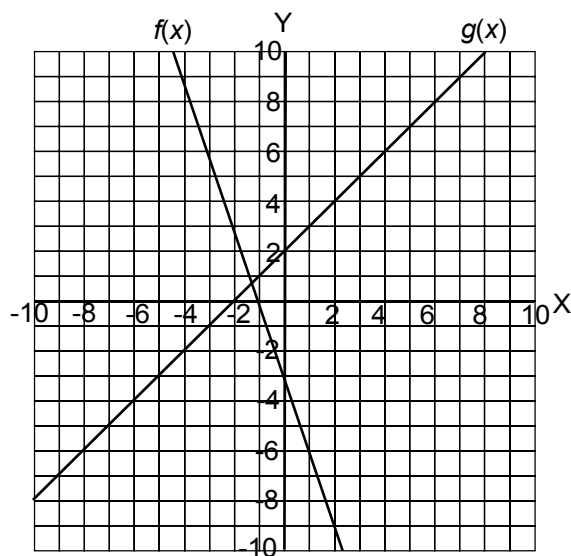
$x$	$f(x)$
0	3
1	4
2	5
3	6
4	7

$x$	$g(x)$
-2	4
-1	1
0	0
1	1
2	4

$x$	$f(g(x))$
-2	
-1	
0	
1	
2	

- b) Let  $h(x) = f(g(x))$ . Write a possible mathematical model for  $h(x)$ .

2. a) Use the graph for the functions  $f(x)$  and  $g(x)$  below to graph  $y = f(g(x))$ .



- b) Let  $h(x) = f(g(x))$ . Write a mathematical model for  $h(x)$ .

## Composition of Functions Worksheet

1. a) If  $f(x)$  and  $g(x)$  are linear functions, use the two tables of values below to complete the table of values for  $f(g(x))$ .

$x$	$f(x)$
-2	-6
-1	-3
0	0
1	3
2	6

$x$	$g(x)$
-6	-2
-3	-1
0	0
3	1
6	2

$x$	$f(g(x))$
-6	
-3	
0	
3	
6	

- b) Write mathematical models for  $f(x)$  and  $g(x)$ .
- c) Find  $f^{-1}$  and  $g^{-1}$ .
- d) Let  $h(x) = f(g(x))$ . Write a mathematical model for  $h(x)$ .
2. a) If  $f(x)$  and  $g(x)$  are linear functions, use the two tables of values below to complete the table of values for  $f(g(x))$ .

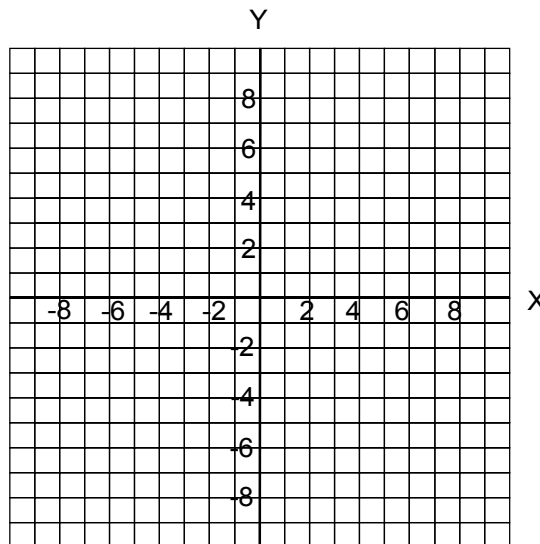
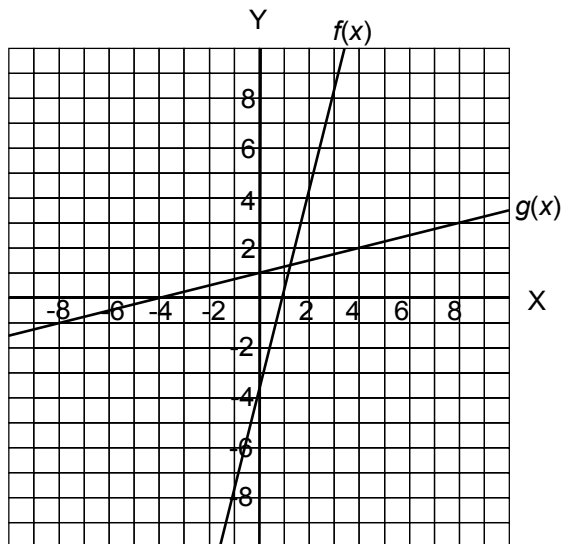
$x$	$f(x)$
-2	-8
-1	-6
0	-4
1	-2
2	0

$x$	$g(x)$
-8	-2
-6	-1
-4	0
-2	1
0	2

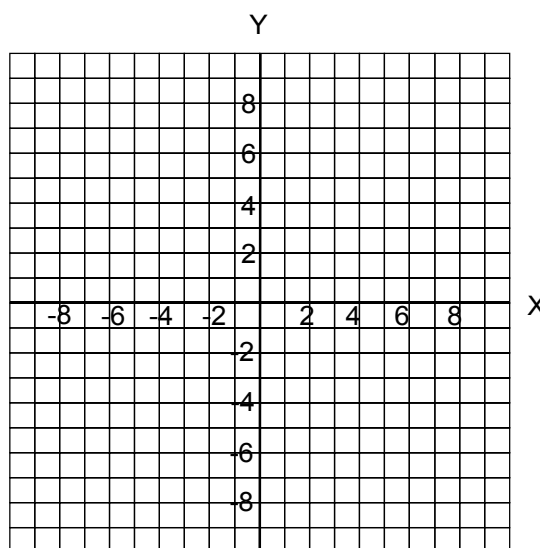
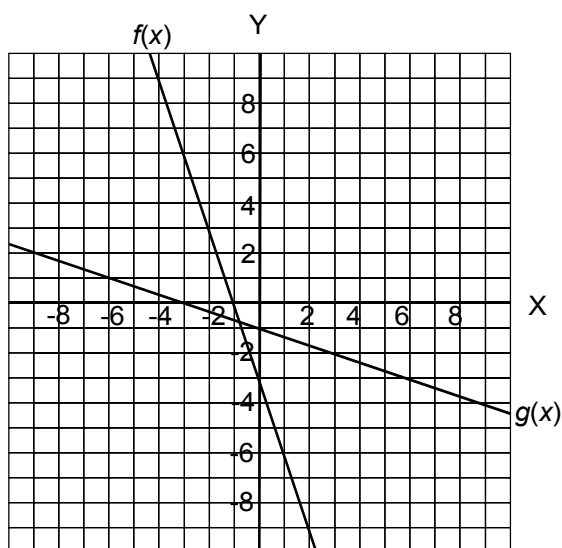
$x$	$f(g(x))$
-8	
-6	
-4	
-2	
0	

- b) Write mathematical models for  $f(x)$  and  $g(x)$ .
- c) Find  $f^{-1}$  and  $g^{-1}$ .
- d) Let  $h(x) = f(g(x))$ . Write a mathematical model for  $h(x)$ .

3. a) Use the graph for the functions  $f(x)$  and  $g(x)$  below to graph  $y = f(g(x))$ .



- b) Write mathematical models for  $f(x)$  and  $g(x)$ .
- c) Find  $f^{-1}$  and  $g^{-1}$ .
- d) Let  $h(x) = f(g(x))$ . Write a mathematical model for  $h(x)$ .
4. a) Use the graph for the functions  $f(x)$  and  $g(x)$  below to graph  $y = f(g(x))$ .



- b) Write mathematical models for  $f(x)$  and  $g(x)$ .
- c) Find  $f^{-1}$  and  $g^{-1}$ .
- d) Let  $h(x) = f(g(x))$ . Write a mathematical model for  $h(x)$ .

5. What do you observe about the composition of inverse functions? Why do you think this happens?
6. a) If the function  $g$  is the inverse of the function  $f$  predict  $f(g(x))$  and  $g(f(x))$ .  
b) Check your prediction given  $g(x) = 2x$  and  $f(x) = \frac{1}{2}x$ .
7. Given  $f(x) = \sqrt[3]{x + 1}$  and  $g(x) = x^3 + 1$  show that  $g(x)$  and  $f(x)$  are not inverse functions.
8. Given  $f(x) = 3x - 2$  and  $g(x) = \frac{1}{3}x + \frac{2}{3}$ , determine if  $g(x)$  and  $f(x)$  are inverse functions? Show the analysis that leads to your conclusion.